REMARKS

In an Office Action with a mailing date of May 12, 2003, the Examiner rejects Claims 1-5 and 11-16 under 35 U.S.C. § 102(b) as being anticipated by U.S. Patent No. 6,027,948 to Jensen, et al. ("Jensen"), or U.S. Patent No. 5,939,772 to Hurst, et al. ("Hurst"), or U.S. Patent No. 5,751,553 to Clayton ("Clayton"). The Examiner rejects Claims 33-34 under 35 U.S.C. § 102(b) as being anticipated by Jensen or by Hurst. The Examiner rejects Claims 40-41 under 35 U.S.C. § 102(b) as being anticipated by Hurst. The Examiner rejects Claims 6-10 and 17-18 under 35 U.S.C. § 103(a) as obvious over Jensen in view of U.S. Patent No. 5,866,942 to Suzuki, et al., ("Suzuki").

Discussion of Rejection of Claim 1 Under 35 U.S.C. § 102(b)

Applicants respectfully traverse the Examiner's rejection of Claim 1. In the May 12, 2003 Office Action, the Examiner rejects Claim 1 under 35 U.S.C. § 102(b) as anticipated by Jensen, by Hurst, or by Clayton.

With respect to Jensen, the Examiner states that "Jensen discloses a housing for protecting an integrated circuit device comprising a molded body 36 encapsulating the integrated circuit device 32; and at least one magnetically permeable foil 54 applied to an outer surface of the molded body as set forth in col. 3, lines 3-14 and fig. 2b." Applicants respectfully submit that Jensen does not teach or suggest "a molded body encapsulating the integrated circuit device."

An example of a "molded body 14" is described by Applicants in connection with Figure 1 and paragraph [0025]. In paragraph [0025], Applicants stated that "[t]he skilled artisan will appreciate that the molded body 14 encapsulates the die 12, in contrast to ceramic packages that are hermetically sealed around a die." Applicants briefly described a further example of a molded body, such as a plastic body, in paragraph [0007] in connection with U.S. Patent No. 4,953,002 to Nelson, et al ("Nelson"), which has previously been disclosed by Applicants in an information disclosure statement. As stated in Nelson, "[t]he "package" or housing is formed by injecting any one of various well known plastic compounds into a mold around that which is to be housed including the leads and the integrated circuit device." See Nelson, Col. 2, lines 23-26.

By contrast, rather than injecting an encapsulant, such as plastic, into a mold which contains an integrated circuit, portions of a ceramic package or a metal package are already formed and are then assembled. For example, in a ceramic package, the integrated circuit is typically inserted between a base and a lid of a package, and then the base and the lid are fused or sealed together. Returning now to Jensen, Jensen states that "[i]n accordance with the present invention, integrated device 32 is placed in package 36 after a die attach material 44 is located on die mounting surface 40." See Col. 2, lines 54-56. Later, "a solder preform 50 is placed on package 36 and lid 52 is placed on preform 50." See Col. 3, lines 6-8. Further, Jensen states that "[a] gold tin preform may be used with a ceramic or metal lid and the assembly can then be heated in a furnace to cause preform 50 to reflow with magnetic field 46 activated during this process." See Col. 3, lines 8-11. Thus, Jensen's package 36 does not encapsulate the integrated circuit device as claimed.

The Patent Office itself recognizes this distinction between molded packages and ceramic packages. For example, the Patent Office classifies molded packages in class 257, sub-class 787, which is entitled "ENCAPSULATED." In another example, the Patent Office classifies ceramic packages in class 257, sub-class 700, which is entitled "Multiple contact layers separated from each other by insulator means and forming part of a package or housing (e.g., plural ceramic layer package)." Thus, Applicants respectfully submit that Jensen does not teach or suggest the invention as defined by Claim 1.

With respect to Hurst, the Examiner states that "Hurst discloses a housing for protecting an integrated circuit device comprising a molded body 12 encapsulating the integrated circuit device 20; and at least one magnetically permeable foil 26, 36 applied to an outer surface of the molded body as set forth in col. 2, lines 1-14, and figs. 1-2."

Applicants respectfully submit that Hurst's base 12 does not correspond to "a molded body encapsulating the integrated circuit device" as claimed. Rather, Hurst's base 12 "has a cavity 18 having a surface 16 for receiving die 20 with surface 16 being a V_{ss} or ground plane." See Col. 2, lines 1-3. "A housing or package is shown in the drawings and is generally designated 10. With reference to FIG.1, package 10 includes a base 12 and a lid 14." See Col. 1, line 67 to Col. 2, line 1. Further, "[i]n assembly, lid ring 44 contacts seal ring 46." See Col. 2, lines 19-20. Thus, Hurst's package 10 corresponds to "a multilayer ceramic package," see Col.

2, lines 26-27, and not to "a molded body encapsulating the integrated circuit device," as claimed. Thus, Applicants respectfully submit that Hurst does not teach or suggest the invention as defined in Claim 1.

With respect to Clayton, the Examiner states that "Clayton discloses a housing for protecting an integrated circuit device comprising a molded body 12 encapsulating the integrated circuit device 54; and at least one magnetically permeable foil 48 applied to an outer surface of the molded body as set forth in col. 9, lines 19-64, and fig. 2." Applicants respectfully submit that Clayton does not teach or suggest the invention as defined in Claim 1.

In particular, Applicants respectfully submit that Clayton does not teach or suggest "a molded body encapsulating the integrated circuit device," as claimed. Rather, Clayton teaches that "the molded module frame 12 comprises an internal cavity 14 which extends over a substantial portion of the length and width of the module to provide a nesting area for electronic components in the finished module assembly." See Col. 5, lines 16-20. Clayton further teaches that a "subassembly 32 is preferably attached to the molded frame by a rectangular ring 58 formed from an anisotropic, electrically conductive adhesive material." See Col. 8, lines 55-58. This "subassembly includes a composite substrate 46 which comprises a thin metal cover plate 48 and thin laminate circuit 50 which is bonded to the metal cover plate 48 by a film adhesive 52. The composite substrate 46 provides a rigid mounting surface for the placement of semiconductor devices 54 and their associated passive components 56." See Col. 8, lines 49-55. Thus, Clayton teaches a package with multiple components that is assembled around a circuit, rather than "a molded body encapsulating the integrated circuit device," as claimed.

Further, Applicants respectfully submit that Clayton does not teach or suggest "at least one magnetically permeable foil applied to an outer surface of the molded body" as claimed. By rejecting Claim 1 over Clayton, the rejections fail to recognize the distinction between a shield for electric fields or for electromagnetic radiation, and a shield for magnetic fields. Clayton does not teach or suggest a "magnetically permeable foil." Rather, Clayton's metal cover plate 48 appears to relate to an anti-static shield for electric fields or to a conductive shield for electromagnetic waves. "In applications involving static sensitive semiconductor devices, electrically emissive semiconductor devices or devices switching or operating at frequencies above 50 MHz., the metal cover plate 48 can function as an electro-magnetic shield or grounding

plane by establishing an electrical ground potential across the cover plate." See Col. 9, lines 19-24. Thus, Clayton teaches using a grounded conductor as a shield. A shield for magnetic fields does not even have to be grounded, as described by Applicants in an example in paragraph [0028], where Applicants stated "[t]he foils 26, 28 are thus electrically insulated from the packaged circuitry and leads." As explained by Applicants, to shield magnetic fields, "[a] metal with a relatively high magnetic permeability can be used to form a shield for protection from magnetic fields. Metals that are used widely in magnetic shielding include soft magnetic or high permeability materials, such as NiFe, NiFeMo and NiFeCu." See paragraph [0004]. Therefore, Applicants respectfully maintain that Clayton does not teach or suggest the invention as defined by Claim 1.

Therefore, Applicants respectfully maintain that Jensen, Hurst, or Clayton does not teach or suggest Applicants' invention as defined by Claim 1, and Applicants request allowance of Claim 1.

Discussion of Rejection of Claim 33 Under 35 U.S.C. § 102(b)

The Examiner rejects Claim 33 under 35 U.S.C. § 102(b) as being anticipated by Jensen or by Hurst.

With respect to Jensen, the Examiner states that "Jensen discloses an integrated circuit die 32; a molded body 36 encapsulating the die; and a magnetic shield layer extending over an outer surface of the molded body and parallel to a major surface of the die, the magnetic shield layer being electrically insulated from the die as set forth in col. 2, lines 42-53, col. 3, lines 1-16, and fig. 2b." Applicants respectfully submit that Jensen does not teach or suggest "a molded body encapsulating the die" as claimed.

An example of a "molded body 14" is described by Applicants in connection with Figure 1 and paragraph [0025]. In paragraph [0025], Applicants stated that "[t]he skilled artisan will appreciate that the molded body 14 encapsulates the die 12, in contrast to ceramic packages that are hermetically sealed around a die."

By contrast, rather than injecting an encapsulant, such as plastic, into a mold which contains a die, portions a ceramic package or a metal package are already formed and are then assembled. Jensen states that "[i]n accordance with the present invention, integrated device 32 is

placed in package 36 after a die attach material 44 is located on die mounting surface 40." See Col. 2, lines 54-56. As described earlier in connection with the Examiner's rejection of Claim 1, Jensen relates to a package which is assembled and fused, "a solder preform 50 is placed on package 36 and lid 52 is placed on preform 50." See Col. 3, lines 6-8. Further, Jensen states that "[a] gold tin preform may be used with a ceramic or metal lid and the assembly can then be heated in a furnace to cause preform 50 to reflow with magnetic field 46 activated during this process." See Col. 3, lines 8-11. Thus, Jensen's package 36 does not encapsulate the die device as claimed. Therefore, Applicants respectfully submit that Jensen does not teach or suggest the invention as defined by Claim 33.

With respect to Hurst, the Examiner states that "Hurst discloses an integrated circuit die 20; a molded body 12 encapsulating the die; and a magnetic shield layer 36 extending over an outer surface of the molded body and parallel to a major surface of the die, the magnetic shield layer being electrically insulated from the die as set forth in col. 2, lines 1-24, and fig. 1." Applicants respectfully submit that Hurst does not teach or suggest "a molded body encapsulating the die" as claimed.

Applicants respectfully submit that Hurst's base 12 does not correspond to "a molded body encapsulating the die" as claimed. Rather, Hurst's base 12 "has a cavity 18 having a surface 16 for receiving die 20 with surface 16 being a V_{ss} or ground plane." See Col. 2, lines 1-3. "A housing or package is shown in the drawings and is generally designated 10. With reference to FIG.1, package 10 includes a base 12 and a lid 14." See Col. 1, line 67 to Col. 2, line 1. Further, "[i]n assembly, lid ring 44 contacts seal ring 46." See Col. 2, lines 19-20. Thus, Hurst's package 10 corresponds to "a multilayer ceramic package," see Col. 2, lines 26-27, and not to "a molded body encapsulating the die," as claimed. Thus, Applicants respectfully submit that Hurst does not teach or suggest the invention as defined in Claim 33.

Therefore, Applicants respectfully maintain that Jensen or Hurst does not teach or suggest Applicants' invention as defined by Claim 33, and Applicants request allowance of Claim 33.

Discussion of Rejection of Claim 40 Under 35 U.S.C. § 102(b)

The Examiner rejects Claim 40 under 35 U.S.C. § 102(b) as being anticipated by Hurst. The Examiner states that "Hurst discloses an integrated circuit package comprising an

encapsulant surrounding an integrated circuit die, the encapsulant including a recess on an outer surface thereof, and the recess configured for receiving and mechanically retaining a magnetic shield foil (fig. 1)."

As Applicants have described earlier in connection with the Examiner's rejections of Claims 1 and 33, Hurst discloses "a multilayer ceramic package," see Col. 2, lines 26-27. This "package 10 includes a base 12 and a lid 14." See Col. 1, line 67 to Col. 2, line 1. Further, "[i]n assembly, lid ring 44 contacts seal ring 46." See Col. 2, lines 19-20. Thus, Hurst's package 10 does not correspond to "an encapsulant surrounding an integrated circuit die," as claimed.

Therefore, Applicants respectfully maintain that Hurst does not teach or suggest Applicants' invention as defined by Claim 40, and Applicants request allowance of Claim 40.

Discussion of Rejections Under 35 U.S.C. § 103(a)

The Examiner further rejects dependent Claims 6-10 and 17-18 under 35 U.S.C. § 103(a) as being obvious over Jensen in view of Suzuki. The Examiner states that it "would have been obvious to one of ordinary skill in the art at the time the invention was made to form the housing wherein the substrate comprises a ball grid array substrate, as taught by Suzuki in order to apply to the manufacture of high frequency semiconductor devices (col. 4, lines 10-11)." While Suzuki does disclose a ball grid array package, Applicants respectfully submit that it would not have been obvious to combine the teachings of Jensen with Suzuki. Suzuki does not discuss teach or discuss magnetic shields, such as the "magnetically permeable foil." Therefore, Suzuki does not teach or suggest the desirability of incorporating a magnetically permeable foil in a ball grid array package or other plastic package. Neither Jenson nor Suzuki, alone or in combination, teach the desirability of the claimed invention nor discuss the need for low-temperature packaging of temperature-sensitive circuits. For example, in paragraph [0021], Applicants stated that "[i]n order to keep the shield degaussed, the shield should be applied as late as possible in the packaging process. This is because during any high temperature steps, the chip must be exposed to a controlled magnetic field to ensure that the 'pinned' or fixed magnetic layers within the chip maintain their desired magnetic alignment."

In addition, with respect to Claims 17-18, Suzuki does not appear to teach or suggest a magnetically permeable foil, let alone a magnetically permeable foil that "is selected from the

group consisting of nickel-iron based alloys, cobalt-iron based alloys, nickel-cobalt based alloys, and amorphous ferromagnetics" or that "has a thickness between about 1 μm and 1000 μm."

Accordingly, Applicants respectfully submit that Claims 6-10 and 17-18 are not obvious over Jensen in view of Suzuki, and Applicants accordingly request allowance of same.

Discussion of Dependent Claims 2-18, 34, and 41

Claims 2-18 depend from and further define Claim 1. Claim 34 depends from and further defines Claim 33. Claim 41 depends from and further defines Claim 40. Accordingly, Applicants respectfully submit that the rejections to dependent Claims 2-18, 34, and 41 are moot in light of the patentability of Claims 1, 33, and 40, respectively, and Applicants request allowance of dependent Claims 2-18, 34, and 41.

Discussion of Added Claims 42 and 43

Applicants have added Claims 42 and 43 to further define the present invention. The added claims are supported by paragraph [0022]. Applicants respectfully submit that a removable magnetically permeable foil is not taught or suggested by the cited art. Applicants further submit that a magnetic shield layer that is removably attached is similarly not taught or suggested by the cited art.

Accordingly, Applicants respectfully request allowance of Claims 42 and 43.

SUMMARY

In view of the foregoing remarks, Applicants respectfully submit that Claims 1-18, 33-34, and 40-43 are patentably distinct over the cited art. Accordingly, Applicants respectfully request the Examiner to reconsider the corresponding rejections made in the May 12, 2003 Office Action.

Applicants further submit that Claims 1-18, 33-34, and 40-43 are in condition for allowance, and Applicants further request the Examiner to pass the present application to the issue process. If there is any impediment to the allowance of the present application, the Examiner is respectfully requested to call the undersigned attorney of record at the number set forth below.

Please charge any additional fees, including any fees for additional extension of time, or credit overpayment to Deposit Account No. 11-1410.

Respectfully submitted,

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Dated: Aug. 06, 2003

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